

Nucleation of p-N-Methylpyrrole in aqueous media.

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This paper describes the results of investigations into the mechanism of poly-N-Methylpyrrole (PNMPy) nucleation in the early stages of the process using different counteranions, nitrate and p-toluensulphonate Tos⁻), in aqueous medium. From the chronoamperometric response the nucleation process has been studied using mathematical equations deduced from the generation of metallic deposits.

On Fig. 1 the first seconds of synthesis of PNMPy in 0.2M NaNO₃ (a) and in 0.1M NaTos (b) are depicted. In both cases j-t transients show the jump of the current density due to the applied potential (I) and the minimum (II) of current density related to the polymer phase nucleation on the electrode.

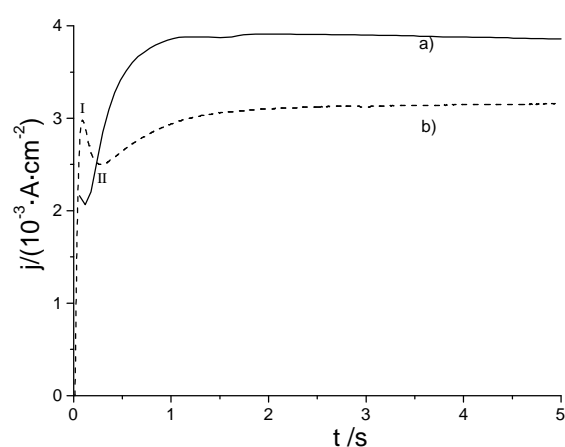


Figure 1.

Considering that the electrodeposition process could be a mixture of progressive (PN) and instantaneous (IN) nucleation with different weight in their contributions, we fitted our experimental data to the equation:

$$j = \frac{a}{\sqrt{t}} \left(1 - e^{-bt} + 1 - e^{-ct^2} \right)$$

where the first term corresponds to IN and the second to PN with three dimensional growth diffusion controlled (1). The parameters a, b and c are perfectly defined. The experimental results show that nucleation process of PNMPy is not the same when doped with nitrate anions or with tosylate anions.

(1) R. Schrebler, P. Grez, C. Veas, M. Merino, H. Gomez, R. Córdova, M.A. del Valle. *J. Electroanal. Chem.* **430** (1990) 77.